

Campbell (H. F.)

STRICTURES OF THE ŒSOPHAGUS.

THEIR NATURE AND TREATMENT,

WITH CASES.

BY

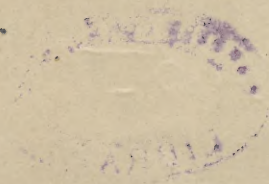
HENRY F. CAMPBELL, M.D.,

OF AUGUSTA, GEORGIA.



Extracted from the
Transactions of the American Surgical Association,
Vol. I. 1883.

PHILADELPHIA:
COLLINS, PRINTER, 705 JAYNE STREET.
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STRICTURES OF THE ŒSOPHAGUS.

THEIR NATURE AND TREATMENT, WITH CASES.

THE frequency of injury to the œsophagus, resulting in obstruction and disability of the tube for the entrance of food into the stomach, gives to this class of accidents, and the conditions arising from them, an importance well worthy the careful consideration of the surgeon. Few who have had the unhappiness to witness the gradual, or more or less rapid closure of this important canal; to note day by day the hunger, the thirst, the restlessness, the wild desire, the appealing calls for help and relief, and then the wan cheek, the anxious eye, the rapidly emaciating frame, all harbingers of a sure and agonizing death, can ever forget the scenes, of which they have been the unwilling witness, nor the cries of the victim—most frequently a child—as the painful echoes of a memory they would gladly efface.

In the discussion before this Association of a condition of such widely recognized importance and acknowledged difficulty, I might well be expected to enter into an extended consideration of the observations and experiences of others in both early and more recent times, carefully weighing and comparing their methods and devices for relief, as well as their views as to the nature of the affection, with my own, especially the opinion I hold in regard to the peculiarities presented by œsophageal stricture. This, in a paper like the present, I can only do to a limited extent, on account of the brief time allowed for the read-

ing of communications before the Association. My object is mainly to present my own experience in a number of cases, which, though limited, has perhaps been more extended than that which falls to the lot of most surgeons in their private practice.

Besides two cases in which I was consulted casually, and others treated by my advice without personal examination and after observation, I can at the present time report four cases treated by myself, and under my direction by others after the obstruction had been partially overcome. Of these four cases I am enabled to give the connected history from notes taken at the time, and to give the final result in each, as from the report of those who have had them under observation, and to whose care the continuance of treatment had been confided. It is on account of what appears to me measurably the satisfactory results of the treatment—dilatation, compared to that more recently suggested method of incision, and also to urge the importance of all expedients for the nutrition of the patient during treatment, however protracted and slowly progressed in, that I am induced to relate these cases and make the present brief remarks.

The œsophagus proper is, as is well known, a musculo-membranous canal extending from the termination of the pharyngeal cavity, about opposite the cricoid cartilage, to the cardiac entrance of the stomach, as generally considered opposite the ninth and tenth dorsal vertebræ. In descending, it slightly deviates in the neck to the left side, making it more accessible here to operation, and, it is thought by Cruveilhier, offering some obstruction, on account of the deviation, to the passage of instruments. The stricture is largely, indeed we may say principally, muscular, the fibre being of the striped or voluntary kind, though the functional activity of the canal is only partly voluntary, being largely reflex. This automatic activity is characterized, even in perfectly natural conditions, by a spasmodic quickness and celerity of contraction in the fibres not known in but very few instances to attach to involuntary movements. The existence of the striped fibre and also the quickness of the reflex activity is known to pertain more particularly to the upper portions of

the tube,¹ where it merges into the pharyngeal cavity with its special muscular apparatus, and even more exaggerated reflex responsiveness to excitants. The disposition of the muscular structure of the œsophagus into layers of longitudinal and circular fibres, while it admirably adapts the canal for its function of deglutition, and accelerating the progress of aliments downward to the stomach, also involves the liability to spasm and stricture under suitable conditions of the mucous membrane, which aptitude and liability constitute, as will hereafter be shown, the most important hindrance to the treatment of organic stricture of the œsophagus, as well as to the ingestion of food. This muscular apparatus and this sensitive lining membrane derive, as is well known, their sensitiveness and excitability from an abundant innervation of the pneumogastric nerve—both trunks descending upon the side of the œsophagus and furnishing innumerable sensori-motor filaments to its muscular and mucous coats throughout its entire length. The normal action then, of the œsophagus, being one of alternating constriction and relaxation, it will be easily seen that under abnormal or traumatic irritation, as by the presence of an abrasion or ulcer, or by the existence of an organic stricture, however partial, it would be constantly liable to the occurrence of spasmodic closures in addition, which of themselves might be, for the time being, shorter or longer, of the most obstructive character. I mention this fact in connection with the instrumentalities concerned in their production, because this character of spasmodic closure, superadded to the organic stricture, was a pretty constant feature in all of my own cases, and doubtless is the cause

¹ See a paper by the present writer "On the law governing the distribution of the striped and unstriped muscular fibre," *Southern Med. and Surg. Journal*, vol. vii. p. 139, March, 1851; also, *Transactions of American Med. Association*, vol. iv. 1851, p. 468: "Whenever celerity or quickness of action is required in a muscle, under any circumstances, we find the striated or more perfect fibre entering into its composition without any regard whatever to voluntary or involuntary motion." This law, the writer maintains, is of universal application, and explains the three exceptions—the existence of striated fibres in the heart and in portions of the œsophagus and pharynx. These were the exceptions that embarrassed the former law of striped fibre to voluntary and unstriped fibre to involuntary muscles.

of much of the obscurity attaching to the cases of others—and interrupting, apparently, the progress of treatment—when not fully recognized and met by some special method of dilatation to avoid the production of, and to overcome, the spasms.

It has been the habit, or rather the method of reasoning, adopted by most of those who have written upon the subject, in the discussion both of its nature and the treatment to be applied, to have before them as a model and guide strictures of the urethra. This I can but regard as a most fallacious comparison, in which only an imperfect analogy and no real parallel exists upon which to base any safe conclusion as to either pathology or treatment. This misleading mode of reasoning, it is thought, may have induced some surgeons recently to adopt the division of the stricture as preferable to the slower, equally effectual, and far safer procedure of gradual and persistent dilatation.

While I cannot profess myself as giving full acceptance to the doctrine so popular with many of late, that incision, whether external or internal, is imperatively necessary for the relief of urethral organic stricture, I regard these operations as comparatively safe, and often commendable, to shorten and facilitate treatment in many obstinate cases. But such procedures are far different in strictures of the œsophagus—first, on account of the hidden character of the obstruction, inaccessible to direct observation, rendering such cutting operations uncertain and hazardous; and, secondly, because the relations of this canal to the mediastinum, the aorta, and to the anastomosing arterial vessels throughout its entire length, would render an incision of even moderate depth extremely dangerous, and perhaps fatal by a penetration of the wall of the tube; and, lastly, because in my own experience I have as yet found no single case which was not amenable to treatment and improvement, by early gradual and persistent dilatation, with instruments carefully adapted to the peculiarities of each case. Most of the cases are brought to the attention of the surgeon, it is true, only in an advanced stage of the obstruction, and not until the œsophageal disability and defective nutrition have caused an amount of emaciation

and exhaustion which threaten death by starvation. But still these patients can at times pass fluids through the stricture into the stomach. This is the ground of hope for almost every case. If any fluid, however tenuous, and however small in quantity, can pass, it may be regarded as a matter of certainty that some form of instrument of carefully selected material can, by patient, careful, and persistent effort, be made to traverse the still remaining area, or what may be regarded the gradually closing canal, and thus secure to the sufferer the prime condition upon which relief by dilatation is to be accomplished, viz., the possible perviousness of the stricture. Any case outside of malignancy in which this can be done is susceptible of relief, if not of permanent cure, by dilatation.

The causes of œsophageal stricture are known to be various. Malignant tumors and malignant degeneration of the walls of the canal, though in their results the most surely fatal of all obstructions, are not, I think, properly classed among true strictures of the œsophagus, as the term stricture would be applied to other canals of the human body.

As my own experience has been almost entirely restricted to cases arising from a single cause, and that cause of a nature capable of producing œsophageal stricture in its most typical form, we have no need to be concerned about the subject of classification in the present paper.

The rapidly increasing manufacture and almost universal purchase and use in the domestic life of certain classes of the salts of potash and soda—"concentrated lye"—in washing, scouring, and other processes of cleansing, render these active caustic preparations more frequently than all other causes combined, the terrible agents by which for some years past, and we greatly fear with increasing frequency for some years to come, this fearful and often fatal condition of the gullet is produced. Concentrated lye and concentrated potash are so constantly reported by rumor and in the daily journals, as well as by medical men, as the cause of death to children by the accidental or unwilling swallowing of the solutions, that the reflective and humane would gladly advocate some legislative enactment which would

place them among the poisons too dangerous to be entrusted to the hands of the people, or to be used in their present forms as a common article of domestic life.

The four following cases will serve to illustrate the frequency of these accidents as produced by this class of agents as they also comprehend the principles and method of our treatment:—

CASE I.—Polly, a colored woman, aged about thirty-eight years, a servant of Mr. P. Fleming, of Augusta, Ga., was, in the winter of 1856, the subject of gastric neuralgia, for which I had prescribed a sedative mixture in which chloric ether and bicarb. soda entered as ingredients; being suddenly seized with one of these gastric attacks she called a younger servant to pour out a wineglassful of the medicine from a bottle. On drinking the contents of the glass she was seized with the most distressing burning in the fauces, and gullet, and epigastrium, which caused her to vomit with great distress the contents of the stomach, and with it probably most of the caustic potash which she had thus taken by mistake.

I was called immediately to the patient, being only a short distance from the house. I caused her to take at once nearly half a tumblerful of olive oil taken from the table cruet. This was to saponify the alkali, and arrest the process of chemical injury to the mucous membrane of fauces and stomach. This was vomited in a short time only slightly changed in character and appearance. The dose was repeated, and about a half glassful of the sweet oil was retained. Nausea and vomiting with burning pain in throat and epigastrium continued for many hours, but was relieved by morphine. Blood and bloody mucus soon began to appear in the matter vomited and expectorated. This patient began at once or within a few days to complain of great difficulty and “spasm in the throat” in all attempts at deglutition; even water was swallowed with great difficulty and pain, though, as she expressed it, it gave her delightful relief from the craving and burning thirst which all the time tormented her.

Deglutition, which was from the first painful and obstructed, in less than two weeks began to be, for hours together, impracticable, and then rather suddenly and unexpectedly she would find some of the fluid to pass into the stomach, but always slowly. The swallowing of solids and semi-fluids had been impossible from the time

of the accident. Finding this woman rapidly becoming weak and emaciated, and not then having the implicit reliance upon rectal alimentation which I now entertain, I determined to begin the process of gradual dilatation at once as an imperative necessity. There were evidently abrasions and unhealed excoriations somewhere in the canal, as was shown by the sanguinolent discharges coming up with the fluids returned on her attempts at drinking. Starvation was staring her in the face, and the face returned the stare with a fixed and abiding expression of hunger, anxiety, and distress, which looked more like the glare of insanity than that of any bodily distress. On attempting to explore the gullet with an ordinary œsophageal bougie of moderate size I found the instrument produced much pain, and was obstructed in the passage a little below the cricoid cartilage. There being much spasmodic action, a No. 10, and then a No. 5 gum-elastic urethral bougie was tried, when the latter passed with some difficulty. This was allowed to remain for a short time, when the No. 10 passed without much more difficulty.

I now passed a conical flexible gum-elastic French catheter, No. 10, beyond the stricture for the purpose of introducing water into the stomach. A glass of water and a glass of milk were thus injected to the great relief of the sufferer.

As the case progressed towards recovery, it was found that the improvement was often irregular, that is, the size of the bougie could not always be increased from one dilatation to another, but at the beginning of each sitting a smaller size than the instrument last used had to be applied before any advance could be made by the introduction of a larger dilator. This apparently discouraging circumstance in the treatment must certainly have been due to spasmodic action of the circular fibres, and not to any real narrowing of the space that had been gained, for it was observed mostly during the earlier periods of the treatment while yet the cicatrices were tender and irritable, and while, perhaps, there may yet have remained some unhealed abrasions or ulcerations at the point of injury. This spasmodic irritability continued many weeks, entirely preventing deglutition, even of fluids, and during which time the daily injection of one quart of milk through a catheter into her stomach was her only sustenance. This spasmodic closure of the gullet would occasionally take place some months after she had been able to swallow both fluids and solids, and when the ordinary bulbous

tube of the stomach-pump could be passed with only spasmodic obstruction for the introduction of water or milk.

After having ceased treatment in this case, she having long since recovered completely the power of swallowing solids, she was taken to the upper part of the State by her employers. While there she was suddenly seized with complete disability to swallow either fluids or solids. The neighboring physician was called in, and all his efforts being unavailing, he proposed that a *mesmerist* who was in the village should see her, saying she must die unless he could relieve her. On arriving and being informed of the nature of the case, he said he would try to relieve her, and called for a glass of water and a piece of corn bread, after which he "thoroughly mesmerized her," and handing her the water, he commanded her to drink it, which she did without apparent difficulty. He then desired her to eat the bread; she hesitated, then rather demurred, and finally ate the whole of it. After having lost sight of this patient for many years, I was sent for in haste, the message being that "Polly's old disease had returned upon her." Being unable to visit her at the moment, I sent her one of the ordinary œsophageal bougies she had formerly used, but the choking had ceased, and she did not find it necessary to resume the self-treatment which had been pursued for a long time after leaving my immediate care.

These suddenly occurring and persistent obstructions to deglutition, relieved in the one case at the behest of a mesmerist, and in the other ceasing spontaneously, cannot fail to be recognized as being of a reflex or spasmodic character, affecting the circular fibres; no organic constriction could either occur or be removed so suddenly by any such influences.

CASE II.—Child of J. J. Anderson, Williston, S. C., aged about eighteen months, had stricture of the œsophagus caused by drinking "concentrated lye" some months previously. At the time of the first examination, August 16, 1881, the child was greatly emaciated, fretful, and crying for water and food. On making attempts at deglutition, some of the food, cake and bread, seemed to enter the upper portion of the gullet, but would be returned in a short time with the water or milk taken, neither solids nor fluids appearing to pass the stricture. The mother reported that the child had been unable to swallow any water or food for four or five days—which period of disability she said was not uncommon, as he had had

several times before prolonged spells of "stoppage," at the end of which he would be able to get down water and milk, with difficulty, for several days at a time. She reported one of these spasmodic closures as lasting nearly nine days, during which the child had suffered great distress and nearly died of hunger. The extreme emaciation and exhaustion of the child, its present and constant distress from prolonged starvation, rendered it important to proceed at once in our attempts at nutrition.

The child being held firmly, and its mouth kept open, assisted by Dr. J. S. Coleman, a Fellow of this Society, a No. 6 bougie was passed, for the purpose of exploration, down to the stricture, which appeared to be a short distance below the cricoid cartilage. The instrument was arrested at this point, and after some cautious and delicate attempts to push it further it was removed. It was covered with thick mucus, mixed with milk and softened bread crumbs, which the child had been attempting to swallow. A No. 8 gum-elastic bougie, with a soft, flexible, and conical point, was now introduced, for the purpose of passing or entering the stricture if possible. The instrument being well lubricated with vasaline, was passed over the finger of the left hand holding down the tongue. No force was or could be used with this soft and very flexible instrument. When it became arrested at the point of the stricture, as the other one had been, it was slightly withdrawn and again gently propelled. This manœuvre being repeated several times, the point soon entered and passed the contraction, when it was with some obstructive compression pushed on into the stomach. On the removal of the bougie, the mother asked if she might give the baby some water, because, she said, "I see by his countenance he can swallow." She further stated that, now being relieved, he would be able to take water and milk for some days, "until he had another stoppage." First water and then milk was given to the child, several wine-glasses of which latter it was allowed to take. It swallowed slowly, but without much apparent spasm. The mother stated it would gradually be able to drink more freely.

As the great and most pressing object was the present nutrition of the child, the mother was directed to supply it cautiously with milk and beef-tea or meat juice. We also directed that these articles should be supplemented by nutritious injections, if a sufficient quantity of fluid nutriment could not be taken naturally. No time was appointed for a second dilatation, but the parents were directed to

bring the child whenever there was a recurrence of the spasm and disability. The child's vitality was so low, that I was not willing to interfere with its gullet as long as it could take nourishment of any kind for the improvement of its health. In about a week the patient was again presented, the same proceeding of dilatation with a flexible, conical gum-elastic bougie, when the child was again relieved.

We found in the several repetitions made, that the instruments, though increased in size, passed more readily each time, and that the intervals between the spasmodic closures were longer, while the child increased in flesh and plumpness.

The season being unfavorable for a delicate child to remain in the city, he was sent home to the care of Dr. John Smith, of Blackville, S. C., who had referred the case to me. The following extract from Mr. Anderson's letter, dated November 19, 1881, four months after beginning of treatment, will show the favorable progress up to that time, both as to improvement in deglutition and general health:—

“The baby is no better in regard to eating any solid food, but he can drink milk. He does not have those long spells of closure of the gullet, as when he was with you; and when he does have it, it lasts not more than an hour or two, or not more than half a day the longest. Dr. Smith has attended him ever since he left you, and has used the bougie a great many times. Sometimes when his throat is closed it gives relief, at another time it seems to do no good. He has increased surprisingly in flesh and strength, and can talk as plain as any child. He has not forgotten you, as small as he is. We can't keep him in church, or in any crowd of people. As soon as he gets there he begins to cry and say, ‘The Doctor bother me!’
(Signed) J. J. ANDERSON.”

The above encouraging and measurably satisfactory account of the case reasonably gave hope of progressive improvement and of a possible ultimate recovery. In preparing our notes, however, for the present report, the information obtained nearly eighteen months after from Dr. W. W. Smith shows that the case afterwards resumed its former unfavorable characteristics.

WILLISTON, S. C., May 10, 1883.

DR. H. F. CAMPBELL.

My dear Doctor: I received your letter the other day inquiring as to the treatment of James Anderson's child. I have been wait-

ing to see Dr. John M. Smith to get the history of the case, but as I have not had an opportunity to see him, and not believing that he could give you anything interesting or profitable, I will just give you what I know of the case. From the time of drinking the concentrated lye, it lost the power of deglutition to a great extent, from which it never recovered. He used various remedies without any good effect. He was never able to effect anything by dilatation. It lived for some time on sugar alone, just as it would dissolve in the mouth, and finally died of inanition.

Yours truly,
W. H. SMITH.

By a comparison of the above two communications, it is evident that the child had been for a time successfully treated by Dr. John Smith with dilatation, as the father reports his frequent and diligent application of the bougies, and the most decided improvement of the child in deglutition and in its nutrition, and also the greatly diminished frequency and persistence of the attacks of spasmodic disability of the gullet. In cases of this most deplorable class there are many things which interfere with the progressive and ultimately successful treatment by dilatation. The alarm of the little patient at the bare idea of the instrument ("Doctor bother me") expresses it fully. The disinclination of the parents to distress the child, so long as it can swallow any food whatever; the engrossing and crowding-out employments of the physician, often a village practitioner with a clientel extending over several counties of the State, all combined to render it probable that progressive dilatation and an overcoming of the spasmodic tendency will not be accomplished even after having been fairly inaugurated; but that, on the other hand, from time to time, the systematic course will be interrupted. The amount of food ingested is so gradually diminished, and the emaciation so imperceptibly advanced, that by the time the parents in alarm compel the attention of the doctor, recontraction to the original degree has taken place, and all that has been gained, though not impossible of recovery, has been, under the circumstances, forever lost, and the child doomed to death by inanition, for want of a longer continued and more systematic treatment.

The note from Dr. Simpson Russ, at the end of our next case, cordially acknowledges his failure to perfect a cure on account of the hindrances to which we have just referred.

CASE III —Daisy Crouch, aged about two years, brought by her parents early in 1882, with disability to swallow even liquid food except at long intervals and with great difficulty. The child was pale and languid, unable to stand, and in a condition of extreme emaciation, with an expression of anxiety and pain. Regarding it from its appearance to be a case of entero-colitis, or cholera infantum, I inquired as to the frequency of its daily evacuations, when the mother told me that the child scarcely ever had an evacuation, as it never ate anything on account of its throat, which had been injured by drinking concentrated lye. The exact date of the accident is not noted. The child was "playing round" at the spring where the grandmother was washing clothes. Unobserved, she suddenly took from the wash-bench a tin can of the concentrated lye and drank some of it. The effect was described as dreadful, the child crying and vomiting, and bringing up mucus and blood, while everybody thought it would die before morning. It finally got better, but was hardly able to swallow anything, and began "to perish away," when it was taken to Dr. Russ, of Graniteville, who, on account of its condition of impending starvation, brought it to Augusta for consultation. In nearly all these cases an examination is made with much opposition on the part of the little patient, and not without the exercise of a good deal of tact and persuasion seconded by more or less force. The child had attempted to drink water and milk, but from the quantity and instantaneousness of its rejection, it was evident that very little or none had passed into the stomach. Though greatly alarmed at the appearance of instruments, this languid little patient made no vigorous resistance to the introduction of the bougies, and a No. 6 flexible conical bougie was, by delicate effort, passed beyond the stricture. This was soon followed by a No. 8, and then a No. 10. No pain seemed to attend their introduction, for after this the child was able to drink, first water and then milk. Being fully convinced of the value of dilatation in this case, as indicated by our first application, a selection of the proper flexible pointed gum-elastic bougies, from No. 8 to No. 12, was advised, and the patient returned to Graniteville to the care of Dr. Russ. In case of failure of deglutition, rectal alimentation was advised, either as the sole and reliable means of nutrition, or as supplementary to the small and precarious amount of food that could be carried past the stricture into the stomach.

Desiring to know the subsequent history and final result of the above case before making our report, I received the following brief and candid note from Dr. Russ:—

GRANITEVILLE, May 15, 1883.

Dear Sir: Your card of inquiry in regard to little Daisy Crouch was received a few days ago, but I am not able to make any report, because she moved from here some weeks after you saw her, slightly improved. She returned a short time ago to this place, where her father is again employed; she is as *fat as a pig*, and seems to be perfectly well, but is not able to swallow solid food without great difficulty. I got tired of working with her at that time, it being so difficult to introduce the instrument on account of her aversion and fear of being hurt. I am satisfied that she could have been entirely relieved if the treatment could have been kept up. I am sorry that I cannot help you out much in the case, and especially as I am, to a certain degree, responsible for the failure.

Yours respectfully, etc.,

SIMPSON RUSS.

From the above very imperfect history it will readily be perceived that treatment for only a brief period, together probably with the healing of the denuded surfaces and gradual subsidence of the reflex irritability, resulted in rescuing the little sufferer from impending starvation, and restored to the gullet a competent capacity for deglutition of fluid nutriment, and a slight capability to digest some solid or semi-solid food. Without the judicious use of dilatation at the time of greatest need, it is the belief of the writer that the reflex excitability, and the spasmodic closure of the canal, would have so entirely occluded the channel and shut out nutrition as to insure the death of the child; even though, as we have seen, the organic narrowing could not have been of itself entirely obstructive. I believe that a resumption and continued use of systematic dilatation would still further improve, or entirely relieve the child of its disability. The following case, though one of greater severity, and attended probably by more serious injury to the structure of the cesophagus, will illustrate the advantage of a systematic, regular, and prolonged treatment by dilatation:—

CASE IV.—T. L. Chance, aged nineteen months, emaciation extreme and every indication of threatened dissolution from inanition.

Stricture of the gullet, located apparently a short distance below the cricoid cartilage, had resulted from the accidental taking of a solution of concentrated lye. The child had for some time been unable to swallow any solid food, and very little water or milk. Of the four cases here reported, this one was by far the most distressing to contemplate, and offered apparently the least hope of benefit from treatment.

A near relation of the family, and one deeply interested in the child, said to me: "Doctor, we all felt certain that the child would die, and, as for myself, I often secretly wished that it could die at once, to end its terrible and helpless suffering."

By the cautious introduction of the ordinary blunt-end gum-elastic flexible bougie, No. 8 in size, we ascertained the situation of the obstruction, but made no attempt to pass the stricture. A No. 6 gum-elastic bougie, with a very flexible, soft, and attenuated end, was now carried into the gullet, and delicately manipulated up and down, at the point of constriction, till it had evidently entered the narrow opening. It was propelled on toward the stomach without meeting any perceptible hindrance, when it was removed, and a No. 8 was passed with little or no more difficulty than the first. For the succeeding three days no very decided advance was accomplished, and the child was allowed to return home with its parents, after having furnished them with graduated sizes of the proper instruments by which they were instructed to cautiously continue the dilatation. Rectal nutriment, with meat broths and milk, was advised as a supplementary means of supplying nutriment. Observing in the parents of this child a clear intelligence and full comprehension of what was required, with aptitude and firmness to carry out the treatment, I thought best to advise that the dilatation be performed by them, as equally safe, less alarming to the patient, and securing more perfect regularity of application than could be expected from any medical attendant. With this view the dilatation was repeatedly done in their presence, and every step in the process carefully explained. The case, however, was remanded to the general care and observation of the family physician. Instructions to return to Augusta for further examination and advice when necessary was also given. The history of the foregoing case is perfected in the letter of Mr. Chance (father of the patient) in reply to questions sent him during the preparation of the present report, about six years after the accident.

LAWTONVILLE, GA., May 25, 1883.

DR. HENRY F. CAMPBELL, Augusta, Ga:

Dear Sir: Yours of the 21st at hand. I will endeavor to answer your questions as best I can.

1st. Name of child, Thomas Lanier Chance.

2d. Age at time of accident, sixteen months.

3d. Date of accident, April 1, 1877.

4th. Time elapsed between injury and beginning of treatment by Dr. Campbell, about three months.

5th. The difficulty of swallowing food began about a month after the accident.

6th. The child was emaciated to a very great extent; was nothing but skin and bone.

7th. There was a discharge of blood at times when I used the probang or instrument down the throat, to open the stricture; nothing like the lining of the gullet was discharged, but there was a very thick mucus.

8th. The first time I brought the child to you, I spent three days in Augusta; the next and last time only one day.

9th. We dilated the throat for about one year, once or twice every week.

10th. The child's present condition is very good. Has not been troubled in swallowing for about three years; only that while eating at times it will get choked, but for a short time. On taking a swallow of water or milk it will get all right.

11th. He is very healthy and fleshy at this time. I consider him all right as far as I know.

12th. We used injections of milk for about one year. We fed him only on very light crackers after he got so that he could swallow anything.

Please give me your opinion as to his future condition; as to what you think of the stricture ever closing again. Hoping you may be able to gain the required information from this, I am very respectfully yours,

(Signed) R. C. CHANCE.

I have been thus particular in securing and presenting, sometimes perhaps tediously, all the facts and minute details pertaining to the progress and the ultimate result of the four cases of oesophageal stricture from chemical injury, in order that the

beneficial results of treatment by dilatation may be illustrated. By a careful review of these facts, I think it will be readily recognized that just in proportion to the regularity and prolonged application of the dilatation, till the capacity of swallowing solid food is attained, will the benefit be progressive and the ultimate result satisfactory. Whenever, by the use of natural deglutition, the solid alimentary bolus can pass the stricture, the improvement is apt to be accelerated, for each such passage of the bolus is attended in a certain degree with the same practically beneficial result of the bougie dilatation, and from that time on the reflex excitability gradually diminishes, until an occasional choking, at longer and longer intervals, is the only trace left of the extreme and impending fatal spasmodic susceptibilities of the injured gullet. Timely and judiciously applied dilatation, if continued even for a brief period, will often rescue the patient from impending death by starvation, and secure a food-way fully adequate for the purpose of nutrition. In a communication from Dr. B. F. Wyman, of Aiken, Georgia, we have illustrated the great value of prompt measures, and the good results of systematic dilatation even with instruments but imperfectly adapted to the purpose. We condense the following summary from Dr. Wyman's letter.

CASE V.—Robert Brown, colored child, aged six years, had accidentally swallowed concentrated lye about one month before. His mother said his mouth had become very much swollen immediately after drinking the lye, and that subsequently it became very raw, and that he had been able to eat scarcely anything since, first on account of the soreness as she supposed, but during the last two weeks the mouth had gotten well, and yet he could not eat any solid food, and even fluids were swallowed with difficulty, and as soon as he had swallowed (even a little milk) that it would be vomited up again. On this account she thought his stomach must be still sore. Upon examining the child I found it exceedingly emaciated; in fact almost a skeleton. I requested that some milk be brought and the child allowed to drink it. He seized the cup with avidity, attempted to drink it, but would strangle, and the milk, or some portion of it, would regurgitate through the nostrils. After

drinking about half a teacup of the milk, the greater portion being wasted in the attempt to swallow, the child almost immediately thrust his forefinger into his mouth as if to gag himself (in order to induce emesis), and the milk was vomited up. I at once suspected there was stricture of the œsophagus near the opening into the pharynx, and probably another stricture at its termination at the cardiac orifice; either that, or there might be still an ulcer remaining at the latter point. On introducing my forefinger (which was unusually long and thin) into the pharynx I found almost complete absence of the aperture of the œsophagus, caused by cicatricial contraction. I proceeded slowly to overcome the stricture by gently inserting the first phalanx of my finger into the orifice; which, after some trouble, I succeeded in accomplishing. I then, by using a small probang, succeeded in clearing the passage to the cardiac orifice of the stomach. This procedure was kept up for about a month, the patient being fed on milk and lime-water in a tablespoonful dose every two hours during the day for several days; after that some solid food was gradually allowed. This patient made a good recovery, and suffered no further inconvenience as long as I kept him in sight.

CASE VI.—Martha Knight, colored girl, aged three-and-a-half years, brought to my office for treatment, the parents of the child stating that some time previously (I forget how long) the child had swallowed some concentrated lye, and since then she had been unable to swallow any solid food. I found the condition almost the same as in the above-reported case—great emaciation and considerable general debility. Upon examination I found some stricture of the aperture, though not nearly as much as in the other case. I found very little difficulty in overcoming it so as to introduce the end of my finger, and by cutting down a sponge probang as small and pointed as possible I succeeded in reaching the cardiac orifice. The treatment was the same, and the patient made a good recovery. This child had no vomiting, simply regurgitations of food and liquids.

Dr. Wyman remarks further: "In connection with this subject I will state that I have seen several fatal cases resulting from the swallowing of concentrated lye. In all these cases death was produced by suffocation; the caustic lye causing swelling of the epiglottis and upper portion of the trachea, thereby rapidly cutting off the supply of air to the lungs from œdema of the glottis.

The Frequency of Chemical Injury to the Œsophagus. Fatal Cases, and others without Treatment.

From the above, and from cases that have transpired within the knowledge of the writer, it may be justly inferred, that the cases of chemical injury of the gullet, especially by concentrated lye, which survive to result in stricture, and apply for treatment, constitute but a *moiety*, while perhaps a majority die from the immediate effects of the caustic, or before any curable treatment has been made available.

CASE VII.—Child of Mr. Stephen Bush, of Edgefield County, S. C., one mile from Augusta. Concentrated lye was swallowed by the child. Fearful excoriation of the mouth, lips, tongue, and fauces was produced. Œdematous swelling soon followed. Dyspnoea supervened, with closure of the air-passage, and the child died in twenty-four hours, from œdema of the glottis. The case was observed and reported to the writer by Prof. N. C. Eve, of Augusta.

CASE VIII.—Austin, aged eighteen months, child of Mr. T. A. Boyle, of Augusta, while in Nashville drank from a tin-can concentrated lye used by a servant in scouring the floor. The child crawled to the can and drank a little before it could be stopped. Olive oil was given. Great excoriation and inflammation of the mouth and fauces resulted, and œdema of the glottis supervened. Prof. Duncan Eve, of Nashville, was called; but treatment was unavailing, and the child died in less than twenty-four hours.

CASE IX.—Walter, aged six years, son of T. W. Boyle, brother of T. A. Boyle. I was consulted in behalf of this child—a healthy boy of six years. When seventeen months old he had found a can of concentrated lye in a closet. He “took some of the lye in his mouth, when it was taken away by his mother.” Great inflammation of the mouth and throat followed, but by application of oil the child recovered without stricture. I found in the case at this time some slight abnormality in the muscular apparatus of deglutition, and occasional spasmodic movements. These symptoms were doubtless the result of the injury during infancy. As they were thought to be less marked than formerly, no treatment was instituted.

This case is mentioned in connection with the preceding one, to show how liable to accident with these dangerous poisons are children; a second case occurring in the same family, despite the warning and the alarm produced by the first.

CASE X.—Colored child, aged two years, drank by mistake “concentrated lye,” used by the mother for cleansing pots. Much swelling of the mouth and throat was caused, and the child was in great agony. Mr. J. W. Panknin, a prominent druggist of Augusta, who reports the case, prescribed olive oil, of which he furnished half a pint, to be taken freely. Subsequent history not known.

CASE XI.—Clarence Gordon, colored child, aged two-and-a half years, residence Augusta, Ga., drank a solution of concentrated lye. Mouth, tongue, and throat were severely burned; could not swallow for many days. Then took fluids with difficulty. The child gradually “perished away,” and died about a year after the accident, no dilating treatment having been used in the case.

CASE XII.—Theodore George Tompkins, colored, aged thirteen months, drank from a tin can containing a solution of concentrated lye used by the mother in scouring the floor. Mouth, chin, and throat, as far as could be seen, “badly scalded.” The child could only swallow water. A physician was called. Lead lotion was used to the mouth. The child became extremely emaciated, and died in five weeks. There was no attempt at dilatation.

CASE XIII.—Theodore Henry, brother of the last case, aged four years. After the death of the first child, concentrated lye was no longer used in the family. “Washing soda” was substituted. The child drank some of a strong solution of the soda. Much injury to the mouth and throat was caused, and the child pined away, and died two or three months after.

CASE XIV.—Furnished by Dr. R. H. Baker, Augusta. A colored child, aged two years, swallowed concentrated lye. Injury to mouth and fauces. Stricture and inability to swallow followed. Case brought to Dr. Baker in extreme emaciation, and apparently too far gone for treatment, and was soon after reported by the mother as having died, six months after time of injury.

CASE XV.—Furnished by Dr. G. W. Mulligan, of Washington, Ga. Lucy Williams, four-and-a-half years old. This child had been in the habit of drinking water from a gourd. The mother had made a solution of the “White Rock” potash in a gourd, and left it, June 27, 1874, on a bench. The child, thinking it was water, drank perhaps an ounce of the very strong solution. The mouth, tongue, and fauces found of a deep red color, with here and there ashen spots. Complaints of great pain in gastric region. Occasional attempts at vomiting. The usual remedies used. Difficulty of breathing added, and on the 29th the child died, asphyxiated, caused, I suppose, from œdema of the glottis.

CASE XVI.—March 4, 1882, Tommy, aged two years, child of Mr. M. J. O’Conner, swallowed a solution of concentrated lye, used by a servant in scouring the floor, lived fifteen months after taking it, dying May 20, 1883. Though suffering dreadfully in the earlier stages, no stricture was discovered until November, when milk sucked from a bottle was constantly regurgitated, and a stricture was discovered. For five, seven, and even ten days at a time, after its first discovery, the child would be unable to swallow fluids, and nourishment was administered entirely by enemata of milk, when suddenly the power of swallowing would be regained, and for three weeks or more the child would be nourished again in the natural way. The mother, Mrs. O’Conner, from whom this account was obtained, reports that dilatation was tried by Dr. Edward Geddings without success. The spasmodic character of the obstruction in this case will be readily recognized from its similarity to Case II. (Anderson’s child), which has already been commented upon in this paper.

C. T., a girl five years old, with childish curiosity, put to her lips a solution of potash, kept in a bottle in the kitchen for cleansing purposes. The contact of the caustic with the mouth being painful, it was evidently withdrawn, and she escaped without serious injury.

Archie B., son of Dr. S. C. Eve, aged four years, observing, as he supposed, a can of condensed milk, of which he was very fond, climbed to an upper shelf in a pantry, and thrust his tongue into the whitish semi-fluid mass it contained. His tongue was severely excoriated, but he experienced no further damage from the enterprise.

To this last collection of cases might be added two or more others occurring within the same limits of locality, concerning which, however, our knowledge is not accurate, except as relating to the fact that serious, and in one case fatal, injury resulted from the accidental drinking of concentrated lye. It may here reasonably be asked, why report a number of inconclusive cases, in which neither the treatment, nor its results can be recorded? To the implied rebuke we patiently answer: That though indeed the primary, and perhaps most obvious object of the present paper, is to study carefully the nature and treatment of strictures of the œsophagus, resulting from chemical injury, in the light of my own experience and observation, yet as an object scarcely less important, and far more widely beneficial is that of showing the fearful frequency of such accidents, and the fatality resulting from them, as will awaken an interest in the restriction of the sale and careless use of the caustics causing such direful results. Early in the present discussion has been foreshadowed our proposition that such humane and wholesome object should be attained through legislative enactments, either in the State or by the general government. This is an object appealing far more to the sanitarian than to the surgeon, though it is necessarily through the surgeon and the general practitioner that the deplorable history and frightful carnage—burning of the innocents—by this insatiate Moloch of the household must come.

The Sale of Poisons.

In nearly all of the States, and throughout the dominion of enlightened people, if not in every one of them, laws have long since been enacted placing under the most careful and imperative restraint the sale of a considerable class of medicines, recognized as poisons by the druggist; by special provision or by their humane caution, this intelligent class of dealers carefully label as "poisons!" while often the addition of the death's-head and cross-bones proclaim to the unlettered and unwary the lethal nature of the drug they are about to handle. But how is it with

the sale and distribution of these potent and destructive chemicals, to the ravages of which we have had so often to refer?

The Potash Fiend, "Continental Concentrated Lye," the Potash Ball, et id omne genus.

For many years past there has been growing up in this country, and possibly in England and other European nations, a trade of the most active, and probably to those engaged in it, of the most profitable kind, in cleansing agents; the intent and functions of which seem to be supplemental and additional to the soap trade.

This commerce deals almost exclusively with alkalis, and had extended to the Southern States, as many older citizens will remember, when nearly fifty years ago common carbonate of soda—"lump soda," as it was then called—began to be used by the washerwomen, scourers, and paint washers as a quick and thorough remover of grease and dirt from soiled clothes, floors, and painted walls. This alkali was dissolved in varying proportions—generally a lump "the size of a piece of chalk," in a bucketful or washtubful of water, was the indefinite formula which guided the intelligence or the stupidity of those who used it.

The amount of labor in washing was lessened, and probably money was saved in the expenditure for soap; but this reckless use of the lye was early discovered to injure the texture of the clothing, and it soon became unpopular with housekeepers, so that no laundress could obtain employment who could be convicted of "using soda in the water." Many phases of the same labor-saving devices, all claiming a more excellent way and "not to rot the clothes," engaged attention and sometimes confidence for awhile, were tried, found wanting, and discarded by all intelligent housekeepers and honest washerwomen, on account of the injurious effects of all of them upon the clothing so treated.

It is unnecessary, as it would be inappropriate, here to follow a history of these various devices, for they cover a period of over

half a century. At best, it was but a contest, in which laziness and dishonesty on the one hand, were opposed on the other by watchful intelligence and enlightened economy. For once and for a while the right did seem to triumph, but in later days the evil in another form again broke out, and has gained a more general and destructive spread than ever before; and, horrible to tell, with ghastly addition to its triumphs—the destruction of human life, swelling the bills of infant and child mortality, I do not hesitate to say, by hundreds every year in this country alone. At the present day there are manufactured and sold in this country two or three articles of the nature referred to, one of which at least has gained a fearful prominence in the sad catastrophies which have attended its careless use, or, as would appear, its *misuse*. Concentrated lye is an article, the exact process of preparation of which is not known, except, we suppose, to the manufacturers. It is sold in painted tin cans, covered by a white label. On the labels of that which appears to be the most popular brand, is printed, after the manner and intent of a trade-mark, “Continental Concentrated Lye.” Directions are given in French, German, and English, for the making of soap by the use of the contents of the can in gallons of water with pounds of fatty materials. The large amount of water and grease it is capable of saponifying, would alone indicate to the scientific its concentrated strength as an alkali, and consequently its destructive energy as a caustic. The report of cases in the present paper, as well as the invariable results of all accidental swallowing of it, fully prove how direful and destructive are its effects; and yet on no part of the label or can, nor on any wrapper inclosing this terrible poison, is there the least intimation that danger or death, or injury of any kind, is to be even suspected! This can, with its white cover, illuminated label, and finely printed directions, and closely resembling in form and size a can of condensed milk, or corned meat, or choice comestible, is sold as freely and unrestrainedly, with no more questions asked and no more cautions given, than in the sale of the most innocent and harmless article of food and luxury.

In ninety cases out of a hundred its professed and legitimate

intent of soap-making is never carried out by the purchasers, but in various ways it is most ignorantly, carelessly, and dangerously handled. The can is left open, strong solutions are made of portions of its contents for various purposes of cleaning, and it is not surprising that the unwary and the innocent should fall victims to their ignorance of danger in the cup, or to their infantile curiosity.

"The star ball potash," unequalled for purity and strength, is another preparation rivalling in commerce and domestic use the concentrated lye. It consists of a mass of potash inclosed in a coating of resin, like the concentrated lye. Though its professed object is the making of soap, it is much more largely used as a cleanser. After being made into a solution of various strengths, it is perhaps less liable to entrap and deceive than the lye, but is handled with equal freedom and carelessness in families, and is not the less capable of destroying life than the one we have shown to have been so fatal in the Southern States.

In the present paper we have depended upon the dozen or more cases collected, most of them within a circle of not over twenty miles in extent, for what is supposed to be adequate illustration of the frequency of the accident arising from the unrestricted sale and careless handling of these caustic preparations. Had the usual and more thorough plan been adopted of sending interrogatives to the members of the profession to elicit individual observations and experience on the subject, it is believed the record would be a most frightful one, in which cases of death or injury, instead of a dozen, could be counted by hundreds throughout the South, and perhaps in all sections of this country, nearly all arising from the same cause. What better could be expected? These caustics are sold in every grocery store in every city, village, hamlet, and cross-road of the country, without caution or even hint of their destructive nature. To earnestly call attention to an influence so adverse and dangerous to the public health, and to ask from the sanitary authorities that protection for the people which all good governments are bound to give, has been in so far the principal object of our discussion. While in the foregoing we have not presumed to

formulate any act or provision looking to the control of the sale and use of the dangerous caustic alkalies, we would suggest that the attention of the National Board of Health be called to the importance of securing from the general government some legislative precept or command by which manufacturers shall be compelled, in view of the perversion of their intent of the article as to soap-making, to have ineffaceably stamped upon the tin can containing the concentrated lye, and written indelibly on their labels the word "*poison*," and for the unlettered, that everywhere recognized warning against danger—the death-head and cross-bones—the black flag declaration of war against humanity.

Some equally effectual warning should be attached to any form of package in which such poisons are sold. Why should strychnine, arsenic, belladonna, and even laudanum, to be handled only by scientific druggists and physicians, be so marked, when this more frequently fatal agent, handled principally by the comparatively ignorant and uneducated, be cast upon the people with no caution, warning, or even hint of danger?

Treatment of Œsophageal Strictures after Chemical Injury.

Though in the history of the four cases forming the basis of this paper, the methods and devices of treatment by dilatation have been more or less particularly dwelt upon as the only course found necessary in what appeared to be several extreme cases, it is thought best to consider the comparative advantage and the dangers of some of the surgical operations that have been recently practised. These are internal œsophagotomy, œsophagostomy, and gastrostomy. Each one of these has been practised in cases wherein there was a real or supposed impossibility of pursuing dilatation to a successful result. In some of the cases in which these cutting operations have been performed, as in obstructions by tumors and cancerous affections of the tube, œsophagostomy or gastrostomy were the only resource, if any attempt at surgical relief was to be made. Such cases, however, do not come within the purview of our discussion, as not properly to be classed as strictures. Internal œsophagotomy,

then, as the only surgical operation claimed to be applicable in the class of strictures we are discussing, is the one which may here be considered. Dr. Morell Mackenzie¹ and Dr. J. O. Roe, of Rochester, N. Y., are the two surgeons who have more recently and prominently practised internal œsophagotomy in cases of stricture and other obstructions of the gullet, while the record of previous operations by others have been given by them. Dr. Roe² regards the operation as "one which must take its deserved place among the operations in the œsophagus," and the published statistics of the operation show that it has been performed from the time of Maisonneuve's three operations, 1861-'62, to his own two quite recently, some fifteen times. Dr. Mackenzie, though reporting one measurably successful operation of his own, yet discusses these, and the results of all internal œsophagotomies by others, in the most candid, impartial, and circumspect manner, and thus we are enabled to compare continued and progressive dilatation as presented in the four cases of the present paper with the result of some fifteen cases in which dilatation was attempted to be supplemented and facilitated by the division of the stricture with the œsophagotome. In his own case, that of a man, the incision was made in the mid line behind, dividing the stricture from below upwards. "There was no serious pain, but in a few hours the patient began to feel some discomfort over the base of the right lung, and unmistakable signs of pneumonia soon afterwards showed themselves. Having continued to manifest signs of pulmonary disease from the time of the operation, the patient died three months after, and at the post-mortem both lungs were found considerably congested, and presenting patches of pneumonia. The right pleural cavity contained a large quantity of sero-purulent fluid. Commencing about one inch below the cricoid cartilage, and extending downward for three inches, the walls of the œsophagus were found to be slightly thickened, hard, and uneven on the inner surface, the lumen of the gullet

¹ Dr. Mackenzie refers to two successful operations by Dr. E. C. Berg, of New York, in *Arch. of Laryngol.*, Jan. 1883.

² See *N. Y. Med. Record*, Nov. 11, 1882.

being considerably restricted for that extent. At the lower part of the stricture an incision about one inch long was found extending through all the coats of the tube below, and through the mucous and part of the muscular tunic, for the upper half of the length, the wound showed but little signs of cicatrization." Dr. Mackenzie remarks on this case that "the pulmonary inflammation to which he ultimately succumbed came on so soon after the operation that it is most probable there was a causal relation between the two events."

The occurrence of structural and inflammatory changes in parts and tissues, distant from the seat of both the strictures and the operation has been quite a frequent sequence upon internal cesophagotomy, and in many of the cases under circumstances in which a perforation of the coats of either the gullet or the stomach could not be charged with this result. Besides others mentioned both by Dr. Mackenzie and Dr. Roe, two of Maison-neuve's three cases were found to have died of peritonitis, one of them died the eighth day after the operation. There was intense peritonitis, the origin and source of which, says Dr. Roe, were entirely unknown, though the cause seemed to be in the pelvis. In one of the Studsguard's cases, a girl eight years of age, who had swallowed lye and was operated on by internal cesophagotomy, the incision being made from above downward through a strong elastic obstruction, two hours after had some pain in the cardia and back, relieved by throwing up some clear blood. Her voice got thick and she could only speak with difficulty, and three times in the afternoon there was much oppression in the chest and dyspnœa, so much so that she grew bluish-red in the face, and it appeared as if she would suffocate. In the last case of Studsguard's we have functional disturbance in the lungs and stomach, which being distant from the seat of the stricture and the operation, could not have been caused by a perforation of the tunics of the gullet, and of which otherwise we have no evidence. Leaving out of our consideration for the present the more obvious (and momentous) dangers of the operation candidly admitted by Mackenzie and Roe, such as perforation of the wall of the gullet, resulting in fatal mediastinal

or pleural abscess, exhausting hemorrhage, and œsophagitis, I have grouped together the class of sequences as above seen, in order that they may be recognized as liabilities and dangers inseparably attaching to any internal œsophagotomy, according to the plainest and most unanswerable physiological reasoning and experiment. No one familiar with the experimental researches of John Reed and others upon the functions of the pneumogastric nerve can fail to find in these results the true interpretation and the probable cause of the phenomena referred to as the not infrequent results of section, or injury of the par vagum; pulmonary congestion, parenchymatous infiltration, pseudo-pneumonia, crepitant râles, dyspnœa, and a disturbed circulation in the structures supplied by the branches of the several trunks, are all familiar results of experimental section of the trunks of the pneumogastric.

As, from the beginning of the present paper, the pneumogastric has been recognized as a most important factor in the production of reflex tonic, and enduring spasm (*spasmus tonicus*) of the circular fibres, which the writer claims it is impossible to distinguish from organic stricture, and which produces the fatal result by starvation, he believes more frequently than the inodular kind. So we now wish to call attention to the fact that it is to the wounding or section of the trunk of the pneumogastric, or of some of its more important branches in internal œsophagotomy that are due the functional and structural changes in the vital parts to which it is distributed, and to call attention to this as one of the most momentous risks to be incurred in the operation as at present devised. We are instructed that the safest line and the only one that ought to be adopted for the incision is along the middle of the posterior wall of the gullet. Leaving out of view for the present the abundant blood supply along this wall, by reason of the anastomotic chain of the aortic œsophageal arteries, rendering incision here most liable to hemorrhage, as it has often been found, and also the tendency to future spasm which repeated wounding of the sensitive mucous lining will produce, let us recognize a danger here before not mentioned, but obviously as much or more to be dreaded even than hemor-

rhage: The trunk (*œsophageal plexus*) of the right pneumogastric nerve applies itself to the posterior wall of the gullet, at the arch of the aorta, and is conducted through the posterior mediastinum to the cardiac end of the stomach on that surface of the tube, while the left trunk of the pair pursues a similar course on the anterior surface of the gullet to the pyloric end of the stomach, where they both supply that organ and become tributary to the solar plexus of the organic system of nerves. In their course downward they each supply abundantly the lungs of their respective sides, while to the œsophagus multitudinous filaments are furnished to the muscular and mucous coats. In Dr. Mackenzie's operation, the incision having been made according to rule upon the posterior wall of the gullet, closely to which is attached the right trunk of the pneumogastric, it is a significant and apposite sequence that crepitant and moist râles, and dyspnoea with serious pulmonary disturbance, continuing for three months, corroborated by a post mortem showing pulmonary infiltration and pneumonic patches, should have followed the operation; all these pertaining almost exclusively to the right lung, or that supplied by the nerve, which, if cut experimentally, would have resulted in these same functional and histological changes. As to the peritonitis and other disturbances of the abdominal viscera, though in the opinion of the writer they can be legitimately attributed to the same cause, he will, after suggesting the explanation, leave it to the decision of others to adopt or reject the induction; but it will be remembered that the gastric branches of this pair are distributed likewise to the omentum, spleen, pancreas, liver, and gall-bladder, and that the pneumogastric is profoundly concerned in the circulation and functional activities of the abdominal viscera.¹

Such then is the "causal relation between the two events" distinctly recognized, but not explained by Dr. Mackenzie; also applicable, we think, to the peritonitis in Maisonneuve's cases,

¹ In the Ophidian reptiles the pneumogastric takes the place of the organic system, and it has ever been recognized as a controller of vascular action in the organs to which it is distributed. Until recently it was known under the significant name of "the lesser sympathetic system of nerves."

viz., section or injury of the right pneumogastric nerve at the time of the operation.

Thus, it will be seen, in the mind of the writer at least, there is added another momentous danger to warn us against, if not to forbid entirely the operation of internal œsophagotomy, and leading hence to the acceptance of the carefully weighed estimate given by Dr. Mackenzie in regard to the three procedures of œsophagostomy, gastrostomy, and internal œsophagotomy. "From an examination of the results of the published cases, internal œsophagotomy does not appear to be a very satisfactory operation. Of the seventeen cases in which it has been practised, four died, *i. e.*, 23.5 per cent. This estimate includes only cases which proved fatal within fifteen days of the operation; the mortality would doubtless appear much higher if all the cases were counted in which death, though directly traceable to the operation, did not occur within the above-mentioned period."

. . . . "As regards internal œsophagotomy, increased experience will probably show that, though its immediate results are not so frequently fatal, its ultimate effects, when successful, are less beneficial to the patient than those of either gastrostomy or œsophagostomy." To which may be added that, considering all its dangers to life, its doubtful permanent utility, and the encouraging results of dilatation, it is an operation which hereafter must depend upon either enterprise or desperation for its adoption, and upon only accident for its success.

Conclusions.

The following results may be summarized from the foregoing discussion of œsophageal strictures from chemical injury:—

1st. That in the definition and classification of stricture of the œsophagus, all obstructions to deglutition resulting from morbid growths or sarcoma, carcinoma, or from abscess or aneurism, bearing upon the walls of the tube, and diminishing or obliterating its cavity by extraneous pressure, should be eliminated, and that the term should be confined to narrowing from histological or functional changes occurring in the structures of the wall itself.

2d. Of stricture proper, as in other canals, the forms of organic and spasmodic exist; but in the œsophagus, on account of its muscularity, abundant supply of sensori-motor nerves, and its functional intent of reflex activity, spasmodic strictures are almost invariably found to attend and to complicate the cicatricial or organic form, and often to occlude the tube under abrasion and injury when organic strictures do not exist, in a degree of themselves to disable deglutition.

3d. That in cases of prolonged œsophageal disability, resulting in extreme emaciation and impending death, the fatal obstruction is the result more frequently of the spasmodic element, than of the inodular deposit imbedded in the walls of the tube, which narrow it, but seldom alone prevents fluid ingesta. It is the frequent and long enduring attacks of *spasmus tonicus*, lasting often from three to ten days, obstructing the passage of instruments and preventing nutrition, that is apt to mislead the practitioner, and by repetition compass the death of the patient.

4th. That a careful consideration of the anatomy and normal functional activities, as well as the habitudes and intent of the œsophagus, will corroborate the above views: for in its last analysis the normal act of deglutition is but an alternation of contractions and dilatations, by reflex excitation of muscular fibres.

5th. That the assumed analogy between urethral and œsophageal strictures, upon which the pathology and treatment of the latter have been based (Maisonneuve), fails in so many important particulars as to render the one a misleading and dangerous guide in the management of the other. In the one, spasmodic strictures are almost entirely confined to a particular and restricted region; while in the other, on account of its universal muscularity, its abundant nervous supply, and functional reflex activity, spasm in the circular fibre, of the most enduring and tetanic character, and indistinguishable from organic stricture, is apt to be excited in all portions of the canal, by irritation of the mucous lining.

6th. That these spasmodic ring-contractions are liable to be mistaken for, and incised as organic strictures, detrimentally

wounding the sensory filaments, thus increasing the number of points for the excitation of future tetanic constrictions.

7th. That the assumption of a guiding analogy between internal œsophagotomy and internal urethrotomy,¹ will at once be recognized as still more disastrous and dangerous, when the important anatomical differences, and consequent risk are to be considered. On the one hand, incisions in every part of the urethra, to any reasonable or even unreasonable extent, are not necessarily fatal, as both hemorrhage and extravasation can be controlled, or guided to a harmless result; while in the case of the gullet, surrounded by and in close contact with vital parts, inaccessible to styptics, and the only dependence for arrest of hemorrhage being spontaneous cessation, the fatality resulting from a penetration of its thin walls; and lastly, the section or wounding of the par vagum, almost unavoidable—all combine to demonstrate that in the plausible analogy there is no parity whatever, either in conditions or results.

8th. That in cases so desperate as to require a cutting operation, on account of failure in every possible method of nutrition, gastrostomy would be less dangerous and more permanently beneficial than internal œsophagotomy.

9th. That in view of the spasmodic nature of the affection, early progressive and long-continued dilatation is, par excellence, *the treatment* for œsophageal stricture resulting from chemical injury; that the dilators used should be smooth and flexible, conical in shape, and scaled as to size from filiform to that of the full diameter of the normal gullet.

10th. That dilatation may be begun as soon after the injury as inflammatory conditions will permit. The existence, or supposed existence of abrasions or ulcerations in the mucous membrane should not delay the beginning of dilatation. The contact of the dilator, instead of increasing, actually lessens the liability to tetanic spasm, by exhausting the reflex excitability of the morbidly sensitive membrane. Sedatives given hypodermically will often assist by relaxing the tonic rigidity of the circular fibres.

¹ It cannot be denied that this was the beginning of internal œsophagotomy with its originator, M. Maisonneuve.



OBJECTIONABLE.

11th. That the practice of dilatation should in each case be instituted and continued by the surgeon until fully established, after which it may in many cases be intrusted to the patient himself; or, if a child, to the intelligent parent or nurse, under the surgeon's supervision.

12th. The length of time during which dilatation should be practised cannot be limited to any particular period. After the deglutition of solids has become practicable, dilatation may be less frequent, as the passing of the alimentary bolus will adequately replace the action and intent of the bougie, in overcoming morbid sensibility and in restoring the natural reflexes of the tube.

13th. That during the treatment of dilatation, rectal alimentation will be found a valuable means of supporting the patient; and since it is known that life and health have been maintained during five years by milk, eggs, and meat pulps placed in the rectum, no case, even of complete and permanent closure of the gullet, could be justifiably subjected to the dangers of any cutting operation for the object of nutrition until after the failure of systematic rectal feeding as an adequate and permanent means of supporting life. This method is certainly no more unnatural and is less objectionable than that of introducing food into the stomach through an opening made by the operation, not devoid of danger, of gastrostomy. As a large majority of the cases of chemical injury to the gullet have been found to result from the careless sale and ignorant use of alkalies applied to domestic purposes, and as such sale and use are more liable to increase than to diminish in the future, the Legislature of each of the States and the national Congress should be petitioned, through their several sanitary organizations, to enact stringent laws requiring that all packages of such dangerous articles thus distributed among the people shall be plainly marked with the word "Poison," and for the warning of the unlettered that the death-head shall also be prominently emblazoned upon the can, box, wrapper, or other containing inclosure.

